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ABSTRACT

Both writers and readers experience auditory imagery of intonations, accents, and hesitations in written language, and some aspects of this "written language prosody" are made partially overt through punctuation. Two studies explored the relationship between written language prosody and punctuation. The first study asked people to read aloud and the second study asked them to repunctuate (insert punctuation marks in passages from which punctuation had been removed) written passages. Subjects for both studies were a group of college students and a group of adult education students. Analysis of the reading aloud task revealed that subjects who read aloud nearly always produced intonation units whose length lay within the normal range for ordinary spoken langauge. Further, the degree to which their segmentations matched the punctuation of a piece of writing provided an index of the degree to which that writing prosodically resembles speech. Findings of the repunctuation task indicated that those subjects came closer than oral readers to matching the punctuation of the original authors. This suggests that because writers and silent readers are able to process large chunks of information at a time and written language provides syntactic as well as punctuational clues to prosodic boundaries, original authors and repunctuators produce longer intonation units than do oral readers. Differences between open and closed punctuation styles and grammatical sites where people tend to insert or delete punctuation contrary to arbitrary "rules" may also be analyzed in light of these findings. (SKC)

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CENTER FOR THE STUDY OF WRITING

Technical Report No. 11

PUNCTUATION AND THE PROSODY OF WRITTEN LANGUAGE

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PUNCTUATION AND THE PROSODY OF WRITTEN LANGUAGE

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When we speak, we produce a variety of consonant and vowel sounds that are more or less well represented by the letters of our writing system. In spite of the inconsistencies of English spelling, there is at least a rough correspondence between the sounds we make in speaking and the letters of the alphabet we use in writing. But there are other aspects of speaking that are not as well represented in writing: the rises and falls in pitch, the accents, the pauses, the rhythm, the variations in voice quality--all of them features of sound that contribute significantly to speaking but that writing shows haphazardly if at all. As a well-known introductory linguistic textbook puts it, "writing never really got around to providing a regular way of marking accent ..., and it has virtually disregarded rhythm and intonation" (Bolinger, 1975: 472).

But to say that written language falls short in representing these "prosodic" aspects of language is not to say that it is an impoverished form of language from which prosody is simply absent, as if it were composed of "words without song." As the same textbook remarks, "we monitor our writing sub-vocally, reading in an intonation, and the fact that the intonation is not actually shown and our reader is going to have to guess at it is as likely as not to escape our attention" (Bolinger 1975: 602).

Eudora Welty, in her autobiographical book *One Writer's Beginnings*, describes the following kind of experience:

> Ever since I was first read to, then started reading to myself, there has never been a line read that I didn't *hear*. As my eyes followed the sentence, a voice was saying it silently to me. It isn't my mother's voice, or the voice of any person I can identify, certainly not my own. It is human, but inward, and it is inwardly that I listen to it. It is to me the voice of the story or the poem itself. The cadence, whatever it is that asks you to believe, the feeling that resides in the printed word, reaches me through the reader-voice. I have supposed, but never found out, that this is the case with all readers--to read as listeners--and with all writers, to write as listeners. It may be part of the desire to write. The sound of what falls on the page begins the process of testing it for truth, for me. Whether I am right to trust so far I don't know. By now I don't know whether I could do either one, reading or writing, without the other.
>
> My own words, when I am at work on a story, I hear too as they go, in the same voice that I hear when I read in books. When I write and the sound of it comes back to my ears, then I act to make my changes. I have always trusted this voice.

Russell Long has made a similar observation, pointing out a relation between writing and reading aloud:

> While some of my colleagues object to my use of the word *hearing* to describe the mental activity that goes on as we write, I am convinced that, at least metaphorically, it is the most accurate term to choose. As I write these sentences, even though my lips are not moving, I am quite conscious of the sound the words I am writing would make *if they were read aloud*. To extend this recognition one step further, I am convinced that the competent writer writes in the same way he reads aloud, using preceding syntactic and semantic context to project meaning, word choice, and punctuation that will follow (Long n.d.: 15).

These quotes from Bolinger, Welty, and Long show that I am not alone in believing that writers when they write, and readers when they read, experience auditory imagery of specific intonations, accents, pauses, rhythms, and voice qualities, even though the writing itself may show these features poorly if at all. This "covert prosody" of written language is evidently something that is quite apparent to a reflective writer or reader.[1]

What follows is an initial attempt to explore the relationship between the covert prosody of writing and one device--in fact the principal device--that writers use in order to make it at least partially overt. That device is punctuation. Although punctuation certainly fails to represent the total range of prosodic phenomena a writer or reader may assign to a piece of written language, it does capture some major aspects of a writer's prosodic intent, to the extent that the quality and impact of a piece of writing may be greatly affected by the author's skill (or lack of it) in punctuating. Furthermore, a skillful author will use punctuation as a resource to enhance the effectiveness of his or her writing, just as a skillful speaker will manipulate pitch and hesitations to enhance the effectiveness of his or her speech.

At this point some readers may object that the signaling of prosody is only one of the functions of punctuation, and perhaps not the primary one. Although that is a common belief, and although certainly there are instances of punctuation that do not serve prosodic ends, I will defend the position here that those instances are departures from its main function, which is to tell us something about a writer's intentions with regard to the prosody of that inner voice.

PUNCTUATION UNITS AND INTONATION UNITS

My own interest in this question has come especially from an interest in seeing how written language compares with spoken. In making such a comparison I have been struck by a relation between certain prosodic units already known to be present in spoken language and certain units of written language that are defined by punctuation. Before going any farther I need to say something more about this.

Spoken language exhibits important prosodic units of a kind that I have been calling "intonation units" (Chafe, 1980, 1987). These intonation units occur as spurts of vocalization that typically contain one or more intonation peaks, that end in any one of a variety of terminal pitch contours, and that usually but not always are separated from each other by pauses. Their grammatical form is variable, but the majority are single clauses. In the following illustration I have written each intonation unit on a separate

line. The sequences of two and three dots indicate shorter and longer pauses respectively, and the commas and question marks show terminal pitch contours of different types:

... But a ... a friend of mine,
this um ... guy I've been going out with,
... he ... he had a student,
.. he teaches flute,
... and
.. did you meet him at my house?
... The flute player?
... Got a blond beard,
looks like my friend Sam?

It is natural to wonder whether and in what way something comparable to these intonation units might be represented in writing, and the answer that immediately suggests itself is that writers show the boundaries of their privately heard intonation units with marks of punctuation. We can compare the intonation units illustrated just above with the following illustration of what we can call "punctuation units" (the stretches of language between two punctuation marks). The example is from Chapter 10 of Thoreau's *Walden* (1854):

> Sometimes I rambled to pine groves, standing like temples, or like fleets at sea, full-rigged, with wavy boughs, and rippling with light, so soft and green and shady that the Druids would have forsaken their oaks to worship in them;

The reader of these lines will, I hope, notice a tendency to "hear" a terminal pitch contour and a pause at each place where there is a punctuation mark. Perhaps this effect is more obvious if the punctuation units are written on separate lines:

Sometimes I rambled to pine groves,
standing like temples,
or like fleets at sea,
full-rigged,
with wavy boughs,
and rippling with light,
so soft and green and shady that the Druids would have forsaken their oaks to worship in them;

The careful reader may also notice certain differences between the spoken and written illustrations. For example, the written punctuation units are more variable in length than the spoken ones, ranging from one word ("full-rigged") to eighteen words ("so soft and green and shady that the Druids would have forsaken their oaks to worship in them"). If we pursued further this attempt to relate intonation units and punctuation units we would find other differences, stemming from at least three sources: (1) a particular writer's lack of skill in punctuating, (2) varying styles of punctuating, and (3) punctuation that is determined by factors other than prosody.

Lack of Skill in Punctuating

Evidently a writer's ability to use punctuation to mark the boundaries of something comparable to spoken intonation units is an acquired skill. This is one of the most obvious areas in which inexperienced writers do poorly. Writing teachers are familiar with examples like the following (taken from Danielewicz and Chafe, 1985, p. 220):

> Lucy never was able to form whole, and completely new sentences whereas
> Helen was able to start conversations and express her ideas.

If this had been spoken language, it is quite possible that there would have been an intonational break after the word "whole," a possibility that probably led the writer to introduce a comma at that point. But certainly it is even more likely that a speaker would have produced an intonation unit boundary after the word "sentences," and this writer failed to mark that break with punctuation. Inexperienced writers may often fail to be guided consistently by their inner voice.

Varying Styles of Punctuating

Even with professional writers, however, we find extensive variation in punctuation use. Much of this variation is associated with different punctuating styles that are popular in different periods, while some of it can be attributed to the habits of individual authors.

During most of the nineteenth century, the fashion was to create punctuation units that were very much like the intonation units of speech. Thus, for example, Melville's description of the last moments of Ahab (*Moby Dick,* 1851):

> The harpoon was darted;
> the stricken whale flew forward;
> with igniting velocity the line ran through the groove;
> --ran foul.
> Ahab stooped to clear it;
> he did clear it;
> but the flying turn caught him round the neck,
> and voicelessly as Turkish mutes bowstring their victim,
> he was shot out of the boat,
> ere the crew knew he was gone.

But even when writing had separated itself from such a close relation to speech, it still showed clear analogies to spoken intonation units, however lengthened, elaborated, and interwoven they may have become. The following example is typical (Edith Wharton, *The Age of Innocence,* 1920):

> Though there was already talk of the erection,
> in remote metropolitan distances "above the Forties,"
> of a new Opera House which should compete in costliness and
> splendor with those of the great European capitals,
> the world of fashion was still content to reassemble every winter
> in the shabby red and gold boxes of the sociable old Academy.

Here the second punctuation unit interrupts the long and complex unit made up of the first and third together, while the last punctuation unit, though uninterrupted, is longer and more complex than anything one would find in normal speech.

In what might be called the Hemingway style, however, the possibility of a relation between punctuation units and intonation units came to be deliberately ignored. The following example is from Hemingway himself (*For Whom the Bell Tolls*, 1940):

> Earlier in the evening he had taken the ax and gone outside of the cave and walked through the new snow to the edge of the clearing and cut down a small spruce tree.

For both physiological and cognitive reasons it would be impossible for a speaker under normal circumstances to produce a single intonation unit as long as this one.

Nonprosodic Uses of Punctuation

The third source of difficulty in equating punctuation units with intonation units is the fact that grammarians, editors, educators, and whoever else contributes to the establishment of written usage have developed a variety of rules for punctuating, not all of which are prosodically motivated. As a result, a piece of writing is likely to contain at least some punctuation marks that were inserted for reasons other than to guide the reader in following the prosodic intentions of the writer. Some may have been placed at grammatical boundaries that were not at the same time prosodic ones, and there may be others that were dictated by completely arbitrary conventions.

The earliest grammars of English emphasized the prosodic function of punctuation, above all its role as an indicator of pauses. Thus Robert Lowth, in his *A Short Introduction to English Grammar* (1762), implicitly recognized the tie between writing and the way language sounds:

> Punctuation is the art of marking in writing the several pauses, or rests, between sentences, and the parts of sentences, according to their proper quantity or proportion, as they are expressed in a just and accurate pronunciation. As the several articulate sounds, the syllables and words, of which sentences consist, are marked by letters; so the rests and pauses between sentences and their parts are marked by points (p. 154).

Although one doubts that he ever made the appropriate measurements, Lowth believed that the period marked a pause twice as long as that marked by a colon, the colon a pause twice as long as that marked by a semicolon, and the semicolon a pause twice as long as that marked by a comma. But there were other marks that had more to do with intonation:

> Beside the points which mark the pauses in discourse, there are others which denote a different modulation of the voice in correspondence with the sense ... The interrogation and exclamation points ... mark an elevation of the voice. The parenthesis ... marks a moderate depression of the voice ... (pp. 171-2)

However, the compendious up-to-date successor to Lowth's grammar, Quirk, Greenbaum, Leech, and Svartvik's *A Comprehensive Grammar of the English Language* (1985), takes the point of view that most punctuation is dictated by grammatical conventions and not by prosody:[2]

> Punctuation practice is governed primarily by grammatical considerations and is related to grammatical distinctions. Sometimes it is linked to intonation, stress, rhythm, pause, or any other of the prosodic features which convey distinctions in speech, but the link is neither simple nor systematic ... Punctuation marks tend, therefore, to be used according to fairly strict conventions and even in the peripheral areas where universal convention does not obtain, each individual publishing house imposes one for all materials that it puts forth in print (p. 1611).

It is not clear whether this statement rests on systematic observation (any more than Lowth's statement regarding the relative lengths of pauses), or whether it simply reflects a folk opinion. It is interesting that immediately following this passage the same authors remark:

> There are two important qualifications to the foregoing generalizations. In the first place, there is, as we shall see, a great deal of flexibility possible in the use of the comma: in its presence or absence, or in its replacement by other marks. The comma in fact provides considerable opportunity for personal taste and for implying fine degrees of cohesion and separation. Secondly, the conventions as a whole are not followed as rigorously in manuscript use (especially personal material, such as private letters), where there may be inconsistencies in their application that would not be permitted in most printed material.

That commas show more flexibility of use than other marks is interesting in view of the fact that the same authors found, in a varied 72,000 word sample from the "Brown corpus" (Francis and Kučera, 1982), that fully 47 percent of the punctuation marks were commas (p. 1613). About half of the marks, then, belonged to this "flexible" category. Beyond that, 45 percent were periods. We will see presently that there is good reason to suppose that, in all but a few special cases, periods represent falling pitch. If, then, 92 percent of the punctuation marks in a representative body of written English are either overwhelmingly prosodic (the periods) or at least subject to "personal taste" (the commas), the statement that "punctuation practice is governed primarily by grammatical considerations" leads to a certain amount of puzzlement.

The second qualification in the above quote is also worth pondering. If "manuscript use" such as private letter writing shows a less consistent adherence to grammatical punctuating conventions, does this mean that writers who are not the victims of copy-editing are able to be guided more consistently by prosody? It is too bad to imply that writers who use prosody-based punctuation are exhibiting a sloppiness "that would not be permitted in most printed material." It would seem that the question should not be put in terms of sloppiness versus care, but in terms of the extent to which writers are guided by their inner voices--by auditory imagery--versus the extent to which they are guided by imposed rules.

But the fact that there are such rules, and that they do exert a significant influence on punctuation can hardly be doubted. As an example we can consider the two possible rules that govern the placement of commas between items in a series. One of these rules arbitrarily inserts commas between all the items in the series, regardless of whether intonation breaks are intended. Thus, commas are prescribed as rigidly in the unitary phrase:

red, white, and blue

which would normally be spoken without any prosodic breaks, as they are in the prosodically separated clauses:

I came, I saw, I conquered.

Any series must have these commas, regardless of the author's prosodic intentions. The arbitrariness of this rule is made even clearer by the existence of the two well known conventions: one that dictates a comma before the *and* in an example like "red, white, and blue," another that omits such a comma: "red, white and blue." Whatever governs the choice between these two conventions, it is certainly not prosody.

As mentioned above and demonstrated below, periods are typically associated with an auditory image of falling pitch. That image is in turn typically associated with the end of a sentence. We see, then, that in many cases there may be no point in asking whether some instance of punctuation is determined by prosody or grammar. So long as prosody and grammar coincide, the only proper answer is "both."

Question marks, on the other hand, provide a good example of punctuation that is at least ambiguous with respect to prosody. Functionally there are two major types of questions: "yes-no" questions and "question-word" questions. Yes-no questions generally exhibit a final rising pitch; question-word questions a falling pitch. (For a fuller discussion, including cases where these pitches are reversed, see Chafe, 1970, pp. 309-345.) That both of the following examples are written with a question mark, in spite of the fact that (a) ends with a rising pitch and (b) with a falling one, shows that function can override prosody in some cases:

(a) Did you buy some artichokes?
(b) What did you buy?

But what may be the clearest example of conflict between grammar and prosody is a negative one: the dictate that a comma must *not* be used between a subject and a predicate. Quirk et al. discuss the following example:

The man over there in the corner, is obviously drunk.

They mention that in speech this sentence "might have a tone unit break where the unacceptable comma has been inserted and we are sometimes tempted to match this with a comma in writing, an error particularly likely to arise with lengthy subjects ... The rule, however, is clear enough and is strictly observed in print" (p. 1619).

Its observance in print, however, is something that developed only recently. We find Melville, for example, frequently writing sentences like:

But this august dignity I treat of, is not the dignity of kings and robes,
(*Moby Dick*, p. 212)

> Only the most unprejudiced of men like Stubb, nowadays partake of cooked whales; (p. 405)

And indeed in current advertisements, apparently less subject to such rules, we find numerous similar examples:

> Two cups of Quaker 100% Natural Cereal mixed with a little of this and a little of that, make the best cookies you've tasted in years.

Or in a student paper:

> Those who are in disagreement, hold that babbling is essential to language development.

Or in a department memo:

> Not asking me, will give me time to post things as they come.

Or in a fortune cookie:

> Those who place all their hopes in money, usually get short changed.[3]

Evidently unconstrained writers still have an inclination to place a comma after a long or heavy subject, thus marking a natural intonation break. Older writers like Melville did this without hesitation, and it is apparently only the fear of rules, or of copy editors, that keeps modern writers from doing the same.

The discussion that follows will try to throw a little more light on the role punctuation plays in making overt the covert prosody of written language. It grapples with the question, "To what extent, and in what ways, does punctuation function to signal the prosody of that inner voice?" It would be much easier to answer this question if there were some direct and independent way of knowing what the covert prosody of a piece of writing was--the prosody intended by the author, and that assigned by a reader. We could then simply compare those prosodies with the punctuation, documenting the places where it coincides and where it does not. Unfortunately, there is no such direct, independent manifestation of the inner voice, and we will have to approach it in more indirect ways.

READING ALOUD

It may be remembered that Russell Long equated the prosody that is "heard" in one's auditory imagery with the prosody that would be present if a piece of writing were read aloud. To repeat part of what he said:

> As I write these sentences, even though my lips are not moving, I am quite conscious of the sound the words I am writing would make *if they were read aloud*. To extend this recognition one step further, I am convinced that the competent writer writes in the same way he reads aloud, using preceding syntactic and semantic context to project meaning, word choice, and punctuation that will follow.

If the auditory imagery we are concerned with could always be made overt by reading aloud, we would have a simple and direct way to submit it to public view. To capture the prosodic intentions of writers, we could ask them to read their own works aloud (whenever that was possible). To capture the auditory imagery of readers, we could ask them to read aloud the works of others. The reasoning might be as follows. Reading aloud converts written language into spoken language, spoken language necessarily has a prosody, and from that prosody we can see (or, better, hear) the prosody that is hidden in the writing. If we are interested in the relation between prosody and punctuation, we can then go on to compare the read-aloud prosody with the written punctuation to see where the two do or do not coincide.

But of course things are not that simple. Reading aloud, when it is examined in any detail, turns out to be a highly peculiar activity. It is neither spoken language nor written language, but both and neither at the same time. Although it is spoken language in the sense that it is, quite literally, spoken, there are very few people whose oral reading would be mistaken for speech. A tape-recording of someone reading aloud will almost always be recognizable as such, for two reasons. First of all, the form of the language itself--its lexical, grammatical, and rhetorical properties--will be of a written rather than a spoken nature. We know written language when we hear it. Second, the prosody used by oral readers--the intonation, hesitations, even the voice quality--will be different from that used by a speaker. People simply do not read aloud the way they talk.

In early 1986 I asked twenty members of an undergraduate class at the University of California at Berkeley to take home with them six brief written passages and read them into a tape-recorder. Since their mean age was about 20, I will refer to this first group of oral readers as "the younger subjects" in order to differentiate them from a second group to be mentioned presently. The passages were intended to be diverse in style and punctuation, and included excerpts from an automobile advertisement in *Time*, from Thoreau's *Walden*, from James's *The Turn of the Screw*, from a news report in the *San Francisco Chronicle*, from Hemingway's *For Whom the Bell Tolls*, and from an article in the *American Anthropologist*. The mean length of these excerpts was 227 words. They are given in Appendix A.

Not wishing to limit this study to college undergraduates, in the fall of 1986 I asked eight people in an adult education class in Santa Barbara to tape-record their readings of a set of similar passages. The mean age of these readers was about 64, and I will refer to them as "the older subjects." Educated two generations earlier and with decades of reading and writing behind them, these older subjects might have been expected to show markedly different prosodic habits from the 20-year-olds, but in fact the differences were minor.

The excerpts that were read by this second group were chosen to be parallel to those read by the college students. I did not use the same passages for both groups, since this was an exploratory study and I wanted to introduce some variety among the readings as well. Again there was an excerpt from *Walden*. To parallel the James passage there was a passage from Wharton's *The Age of Innocence*. There was another news report, this time from the *Santa Barbara News-Press*. Instead of an automobile advertisement, I chose a software advertisement in *Time*, and a different article from the *American Anthropologist*. Instead of Hemingway, I used an excerpt from Agee's *A Death in the Family*. The mean length of these excerpts was 220 words. They are given in Appendix B.[4]

These tape-recordings were transcribed like any other samples of spoken language, special attention being given to the boundaries of intonation units. A distinction was made between terminal pitch contours showing falling pitch, as at the end of a sentence, and any other, non-falling terminal pitch contours. Contours of the falling-pitch type were transcribed with a period, those of the non-falling pitch type with a comma.

The intonation units of ordinary spoken language show a relatively constant length in terms of the number of words they contain. This length varies from language to language depending on the language's morphological type, since some languages pack more information into a word than others. In English the mean length of an intonation unit is between 5 and 6 words. It is interesting, then, that the mean length of the intonation units produced by the younger subjects in oral reading was 5.7 words, and that produced by the older subjects was 5.2 words, both within the typical range of ordinary spoken language. This figure can be compared with the length of the punctuation units in the excerpts these people were reading from, where the mean was 8.9 words for the passages read by the younger subjects and 9.4 words for the passages read by the older subjects. The oral readers obviously introduced many more prosodic boundaries than were signaled by the punctuation in the passages before them. Evidently they went beyond the punctuation in order to make what they were saying coincide with the norm for spoken language. From this evidence it would seem that all spoken language--including oral reading--adheres to a strong constraint on intonation unit length. If a written passage fails in its punctuation to allow for that constraint, oral readers will introduce their own prosodic boundaries in order to bring their reading into line with what seem to be unavoidable requirements of speaking.

There were real differences between the six passages in the extent to which their punctuation reflected this spoken language constraint. (The passages were chosen with such differences in mind.) Table 1a shows, in the lefthand column, the mean number of words per punctuation unit for each of the six passages, increasing from a low of 5.4 words for the advertisement in *Time* to a high of 13.3 words for the article in the *American Anthropologist*. The righthand column shows the mean number of words per intonation unit in the orally read versions of these passages. The range here was much smaller: from 4.5 to 6.6 words, a range that might be found in spoken language. The reading aloud was closest to the punctuation in the advertisement, with 4.5 words per intonation unit reflecting the 5.4 words per punctuation unit of the original. It diverged farthest from the punctuation in the academic article, with 5.7 words per intonation unit reflecting the 13.3 words per punctuation unit of the original.

Table 1a. Comparison of Lengths of Punctuation and Intonation Units
(Younger Subjects)

	Mean Words per Punctuation Unit in Original Passage	Mean Words per Intonation Unit in Read-Aloud Versions
Advertisement	5.4	4.5
Thoreau	6.9	5.2
James	9.6	6.5
Newspaper	11.9	6.2
Hemingway	12.1	6.6
Academic	13.3	5.7
Overall	8.9	5.7

Table 1b gives the same information for the older subjects. It can be seen that the results are similar. Whereas the punctuation units of the original passages increased in length from 6.5 words for Thoreau to 12.5 for Agee, the intonation units ranged from 4.7 to 6.0, evidently just as constrained by the requirements of speaking as they were for the younger subjects. (The ordering of the genres was somewhat different in this respect. Especially noticeable is the fact that the software advertisement here contained punctuation units almost twice as long as the automobile advertisement in the earlier data.)

Table 1b. Comparison of Lengths of Punctuation and Intonation Units
(Older Subjects)

	Mean Words per Punctuation Unit in Original Passage	Mean Words per Intonation Unit in Read-Aloud Versions
Thoreau	6.5	5.2
Wharton	8.8	6.0
Newspaper	10.0	4.7
Advertisement	10.0	5.5
Academic	10.8	4.8
Agee	12.5	5.4
Overall	9.4	5.2

Since speaking of any kind evidently imposes a strong constraint on intonation unit length, we have here a measure of the degree to which the punctuation of a particular piece of writing accords with the prosody of spoken language. Thus, we can say that the automobile advertisement as well as the Thoreau passages were quite spokenlike in this respect, whereas the academic articles and the Agee were especially unspokenlike in their punctuation.

The oral readers obviously introduced many prosodic boundaries that were not signaled by punctuation marks in the writing. The percentages that follow are based on the oral reading of the younger subjects only; percentages for the older subjects were similar. Of the total number of prosodic boundaries in the versions read aloud by the younger subjects, about 60 percent reflected punctuation marks in the written passages, while 40 percent did not. Ninety-one percent of the added boundaries were non-falling pitches and only 9 percent falling. Thus, when these oral readers added prosodic boundaries over and above those indicated by the punctuation, they nearly always added boundaries that were not of the sentence-final type.

The punctuation marks that the written passages did contain were almost always read as prosodic boundaries. In only 6 percent of the possible cases was a punctuation mark not read aloud as a boundary. Furthermore, in most cases the kind of punctuation determined the kind of prosody. That was especially true of periods, which constituted 37 percent of the punctuation marks in the written passages. Ninety-four percent of these periods were read aloud as falling pitches. More common than periods were commas, constituting 52 percent of the punctuation marks in these passages. Commas were not quite as strong a determinant of a particular read-aloud intonation: 66 percent were read as non-falling pitches, while 25 percent were read as falling. These

proportions were, however, skewed by the Thoreau passage, where 44 percent of the commas were read as if they were periods. (The passage itself contained only two periods.) If we left the Thoreau passage out of account and looked only at the 5 other passages, 72 percent of the commas were read as non-falling pitches and 16 percent as falling. To summarize, periods were almost always read aloud as falling pitches, while commas were usually read aloud as non-falling pitches, though the proportions in the latter case were not quite as overwhelming.

Although periods and commas together constituted 89 percent of the punctuation marks in the original passages, it is of some interest to see how other punctuation marks were read aloud. There were some that were usually read aloud as falling pitches. For example, semicolons were read as falling pitches 89 percent of the time. Colons, of which there were only two examples, were read as falling pitches 95 percent of the time. The one question mark was read as a falling pitch 90 percent of the time. This question mark occurred at the end of a question-word question ("How was this ... accomplished ... ?"), where a falling pitch is normal. The only marks beside commas that were usually read aloud as non-falling pitches were parentheses. The three open parentheses were preceded by non-falling pitches in oral reading 80 percent of the time, and the one close parenthesis that was not immediately followed by a comma was read aloud as a non-falling pitch 95 percent of the time. The four dashes, all of which occurred in the Henry James selection, were prosodically ambiguous. When the dash could be interpreted as the end of a sentence (regardless of the following context), it was usually read as a falling pitch. When, on the other hand, it functioned to set off a parenthetical remark ("She wished, of course--small blame to her!--to sink the whole subject;") it was usually read as a non-falling pitch. Thus the dash, like the question mark, apparently has no consistent pitch interpretation, but receives such an interpretation from its context.

REPUNCTUATING

We can by no means be certain that reading aloud captures completely the auditory imagery that is in a writer's or reader's mind during the silent processing of written language. Reading aloud is useful in showing that there is a correspondence between punctuation marks and their prosodic interpretation. Not only do oral readers interpret punctuation marks as signals of prosodic boundaries, they also interpret specific marks as signals of specific kinds of boundaries. But what of the many boundaries oral readers introduce that are not signaled by any punctuation? Are such boundaries also present for silent readers, or are they introduced only because of the requirements of spoken language production? If spoken language is locked into a format in which intonation units contain about 5 or 6 words, that accounts for the 40 percent of the read-aloud prosodic boundaries that were not triggered by any punctuation. But why should the auditory imagery that accompanies silent writing or reading be subject to the same spoken-language constraint? Why should either writers or readers be locked into the same 5- or 6-word format?

Writers have the leisure to construct longer units and, since they can peruse a segment of language repeatedly, they are not subject to the same short-term memory limitations as speakers. Time is less pressing for writers than for speakers. But what of silent readers? The relation between reading and listening is a curious one. Of necessity we can listen only as fast as we are spoken to. In listening to a speaker whose pace is too slow, our minds may try to leap ahead, but if we are really listening

we have no choice but to follow the tempo of what is being presented to us. In reading, on the other hand, we are free of any tempo constraint that might be imposed by the producer of the language. We can follow whatever pace is comfortable, speeding up and slowing down as we wish. There is nothing to prevent us from exceeding the approximately 180-words-per-minute pace that governs speaking, and therefore listening. If readers of written language are able to assimilate chunks of language that are larger than speakers of spoken language are able to produce, then the 5 or 6 word ceiling of spoken language need not be a restriction that applies to silent auditory imagery. To find out more about this, we need to look at written language prosody in ways that are free of the constraints inevitably placed on spoken language production.

One possible way is to ask people to provide their own punctuation for written passages from which the original punctuation has been removed. To the extent that these "repunctuators" are guided by their auditory imagery, their punctuation may give us some idea of what that imagery is. As with any assignment of punctuation, the disturbing factors listed earlier may be present. People may be more or less skilled in using punctuation to represent their prosodic imagery. They may be influenced by current fashions in punctuating. And they may also be influenced by non-prosodic rules of punctuating. For these reasons we cannot take repunctuation as an unambiguous indicator of prosodic imagery. In spite of these reservations it does appear that repunctuation may give us some useful insights into that imagery.

At the same time that I collected the first set of oral readings discussed above, I also asked 20 other undergraduates to repunctuate the same passages. I gave them doctored versions which lacked all punctuation, and asked them to insert punctuation as they thought appropriate. Later I did the same with another group of eight older subjects, using the passages that had been read aloud by the older subjects discussed above.

So far as the length of the resulting punctuation units is concerned, with both groups of subjects there was a closer correspondence between the repunctuators and the original authors than there was between the oral readers and the original authors. It will be recalled that the mean length of intonation units in the younger subjects' reading aloud was 5.7 words, as compared with 8.9 words in the punctuation units of the original passages. The mean length of the punctuation units created by the younger repunctuators was 9.4 words. And, whereas the mean length of intonation units in the older subjects' reading aloud was 5.2 words, as compared with 9.4 words in the punctuation units of the original passages, the mean length of the punctuation units created by the older repunctuators was 10.6 words. In other words, for both sets of repunctuators the punctuation units tended to be even somewhat longer than those of the originals, but closer in length to the originals than were the intonation units of the oral readers.

More interesting is the fact that the introduced punctuation units showed no ceiling effect of the type that kept the oral readers from producing intonation units that averaged between 5 and 6 words in length. Table 2a shows how, in general, as the punctuation units of the originals increased in length, from the automobile advertisement at one extreme to the academic article at the other, the punctuation units of the younger repunctuators also increased in length. In the advertisement and the James, the introduced punctuation units were almost identical in length to those of the original. They differed by about one word in the Hemingway and the newspaper article. The difference was somewhat greater in the case of the academic article and especially the Thoreau.

Table 2a. Comparison of Original and Repunctuated Units
(Younger Subjects)

	Mean Words per Punctuation Unit in Original Passage	Mean Words per Punctuation Unit in Repunctuated Passage
Advertisement	5.4	5.6
Thoreau	6.9	10.0
James	9.6	9.7
Hemingway	11.9	11.2
Newspaper	12.1	13.2
Academic	13.3	11.1
Overall	8.9	9.4

Table 2b shows the pattern for the older repunctuators. Here the introduced punctuation units were almost identical in length to those of the original in the academic passage. They were about one word longer for the advertisement, and about two words longer for the Thoreau, Wharton, and newspaper excerpts. For the Agee passage, on the other hand, they were about two words shorter. Again there appears to have been no limit on the length of the punctuation units, but their correspondences to the original punctuation units were quite diverse.

Table 2b. Comparison of Original and Repunctuated Units
(Older Subjects)

	Mean Words per Punctuation Unit in Original Passage	Mean Words per Punctuation Unit in Repunctuated Passage
Thoreau	6.5	8.7
Wharton	8.8	10.9
Newspaper	10.0	11.7
Advertisement	10.0	11.2
Academic	10.8	10.9
Agee	12.5	10.7
Overall	9.4	10.6

To what extent did this punctuation agree with that of the original authors? For the younger subjects 80 percent of their punctuation marks, and for the older subjects 83 percent, corresponded to some kind of punctuation in the original passages. These figures can be compared with those for reading aloud, where for the younger subjects 60 percent of their prosodic boundaries reflected original punctuation, and for the older subjects 53 percent.

However, while the repunctuators tended more than the oral readers to punctuate in just those places where the authors had punctuated, there was less agreement with respect to specific kinds of punctuation. For the younger subjects 66 percent of the original periods, for the older subjects 76 percent, were mirrored by periods in the

repunctuated versions, as compared with the falling pitches used in reading periods by 94 and 95 percent of the younger and older oral readers respectively. For the younger subjects 54 percent of the original commas, for the older subjects 49 percent, were mirrored by commas in the repunctuated versions, as compared with the non-falling pitches used in reading commas by 66 and 65 percent of the younger and older oral readers. The oral readers, of course, saw the authors' punctuation marks, while the repunctuators did not. Furthermore, the repunctuators were free to use marks other than periods and commas, whereas the oral readers were transcribed as having only falling or non-falling pitch contours. This freedom to use other punctuation marks contributed to the distance between the originals and the repunctuated versions. For example, 17 percent of the original periods were repunctuated by the younger subjects as neither periods nor commas.

If oral reading can suggest the degree to which the punctuation of a particular piece of writing is spokenlike, repunctuating, by showing us the punctuation that a consensus of readers would assign to a piece of writing, can suggest the degree to which a piece of writing captures the auditory imagery of ordinary readers. In that light we can say that in the first set of readings the automobile advertisement and the James captured the readers' auditory imagery very well, while in the second set the same was true for the academic article. The greatest discrepancy, in either set, perhaps surprisingly, was with Thoreau, who used much shorter punctuation units than the repunctuators did.

WHY ARE PUNCTUATION UNITS LONGER THAN INTONATION UNITS?

One finding that is clear from a comparison of Tables 1a, 1b, 2a, and 2b is that, for a given piece of writing, the mean length of punctuation units is always greater than the mean length of the intonation units produced by oral readers. This is true whether the punctuation units were those produced by the original authors, or whether they were those produced by the repunctuators. The difference between the punctuation and intonation units is greater for some pieces of writing than for others, but the difference is always there. Why should there be this consistent difference?

Two possibilities suggest themselves. One is that both writers and silent readers are able to process larger chunks of information at a time. For writers, their freedom from a speaker's need to create language on the run may provide the leisure to create punctuation units that exceed the length of what a speaker is capable of. For silent readers, unconstrained by the necessity to follow the pace set by a speaker, it may be possible to assimilate more information in a single gulp of comprehension (assuming that comprehension also takes place as a series of brief acts).

An alternative possibility is that written language signals prosodic boundaries in other ways, in addition to punctuation. Perhaps a writer's or reader's prosodic interpretation of a piece of writing is not dependent on punctuation alone. More specifically, perhaps learning to deal with written language involves learning to give prosodic interpretations to specific syntactic patterns, even when punctuation is not involved.

There may be no point in trying to choose between these two alternatives, for it is likely that both are correct. It is likely that the syntax of written language does provide clues to prosodic boundaries, but also that these boundaries can be, and often

are, extended beyond what would be natural in spoken language. It is likely in addition that both writers and readers have flexibility, creating syntax and interpreting syntax prosodically in ways they find most comfortable under their own individual conditions of expression and understanding. A writer's omission of punctuation maximizes such flexibility. Instead of locking the reader into a single prosodic interpretation, a writer may leave possibilities open.

To make this more concrete, it is instructive to look at cases where the original authors and the repunctuators inserted approximately the same number of punctuation marks, but where the oral readers inserted more. Such was true of the selection from James, where the mean number of words per punctuation unit in the original was 9.6 and for the repunctuators 9.7, but the mean number of words per intonation unit for the oral readers was 6.5.

James wrote, for example:

We were to keep our heads if we should keep nothing else--

Sixteen of the repunctuators agreed with James in preserving this sequence as an unpunctuated unit, only 4 of them inserting a comma after "heads." Among the oral readers, on the other hand, 17 of them inserted a non-falling intonational break after "heads," only 3 of them pronouncing the entire sequence as a single intonation unit. Most of the oral readers thus quite characteristically divided these 12 words into two 6-word units. Why did James write all this as a single unit, and why did the repunctuators agree with him? In spoken language there is a constraint that limits the amount of information in a single intonation unit to one "new" idea--new in the sense that it is being newly activated for the hearer (Chafe, 1987). Such information contrasts with that which is "given," or already activated. There is, however, a gray area of information that is inferrable from the context. Rather than being completely new, such information can be regarded as in some way already "accessible." The first clause of the above example, "we were to keep our heads," expresses information that is accessible from the immediately preceding clause:

we were of a common mind about the duty of resistance to extravagant fancies.

"Keeping our heads" is essentially a paraphrase of "resisting extravagant fancies." In this context, the sequence "we were to keep our heads if we should keep nothing else" does not really express two new ideas but one, the idea contained in the second clause. Beginning with the accessible idea "we were to keep our heads," it adds the new idea "if we were to keep nothing else." That new idea itself, furthermore, does not carry forward the development of ideas in the narrative, but serves only as a reinforcement of the preceding idea.

The point is that, whereas this example may appear superficially to convey two clauses worth of new information, and thus to be too much to process in a single gulp of comprehension, in fact the first clause conveys information that is already accessible from the immediately preceding context, while the second clause conveys new information that does nothing more than to emphasize what preceded. A reader's cognitive capacities are not, then, severely taxed by the need to interpret this sequence as a single unit. Furthermore, if a reader did need to interpret it in two separate acts of comprehension, the word "if" can be almost as good a signal for a break as a comma would be. By not using a comma after "heads" James showed his understanding of the light cognitive load

exacted by this sequence in the context given. But in addition, the clause structure, clearly signaled by the word "if," makes it easy for the reader to direct either one or two focuses of attention on these words, whichever seems most comfortable.

CLOSE VERSUS OPEN PUNCTUATING

If punctuation serves to make a writer's prosodic intentions explicit, but if at the same time there are other cues which, in the absence of punctuation, enable readers to assign their own prosody, then writers can enjoy a certain amount of freedom in this respect. While few of them are likely to deviate from using periods at the ends of declarative sentences, in the use of commas they may be entirely explicit, or they may leave prosody in part to the imagination.

Such flexibility opens the doors to fashion. Where choices can be governed by taste rather than inevitable rules, the tastes will vary with the times and the creativity of individuals. The continuum of possibilities in the use of commas has come to be identified in terms of "close" or "open" punctuating. At the present time it is fashionable to prefer a relatively open style. As stated in *The Chicago Manual of Style* (p. 132):

> The tendency to use all the punctuation that the grammatical structure of the material suggests is referred to as close punctuation. It is a practice that was more common in the past, and though it may be helpful when the writing is elaborate, it can, when misused, produce an uninviting choppiness. There is a tendency today, on the other hand, to punctuate only when necessary to prevent misreading. Most contemporary writers and editors lean toward this open style of punctuation yet preserve a measure of subjectivity and discretion.

We have seen that the close punctuating favored in the past was more in accord with the prosody of speech. Probably this fact was related to the widespread habit of reading aloud, as described, for example, by Walter Ong (1982, pp. 115-116):

> The famous *McGuffey's Readers*, published in the United States in some 120 million copies between 1836 and 1920, were designed as remedial readers to improve not the reading for comprehension which we idealize today, but oral, declamatory reading. The *McGuffey's* specialized in passages from "sound-conscious" literature concerned with great heroes ("heavy" oral characters). They provided endless oral pronunciation and breathing drills.

The constraints on information flow that are responsible for the intonation units of spoken language were, then, during the nineteenth and early twentieth centuries, applied as well to the punctuation of written language. The trend toward open punctuation seems to have gained momentum at the same time that the popularity of oral reading declined. As is customary when rules are legislated, this change was validated with appeals to logic (one should not "separate inseparables"), or aesthetics (one should avoid "uninviting choppiness"), or the ease with which a rule can be stated ("the rule is clear enough"). But in the end all such appeals simply rationalize the results of a decline in the habit of reading aloud, the most powerful of the ties between writing and speaking.

Thoreau provides an interesting case study of what might now be regarded as exaggerated close punctuation, although, as we shall see, the choices may not always have been those of Thoreau himself. In reading the following passage aloud, virtually 100% of our subjects inserted prosodic breaks just where Thoreau had shown them, and few of them inserted breaks anywhere else, except that 70% also introduced a break after "shady" in the last line. Thus, Thoreau's frequent use of commas seems to have accorded well with the requirements of speaking:

> Sometimes I rambled to pine groves,
> standing like temples,
> or like fleets at sea,
> full-rigged,
> with wavy boughs,
> and rippling with light,
> so soft and green and shady that the Druids would have forsaken their oaks to worship in them;

The repunctuators, on the other hand, were very conservative in punctuating this passage. There was only one comma that was inserted by more than half (75%) of them:

> Sometimes I rambled to pine groves standing like temples or like fleets at sea,
> full-rigged with wavy boughs and rippling with light so soft and green and shady that the druids would have forsaken their oaks to worship in them.

It is interesting that Thoreau's original intentions for this passage fell between these extremes. In the draft of the manuscript sent to the printer he punctuated as follows:

> Sometimes I rambled to pine groves standing like temples,
> or like fleets at sea,
> full-rigged with wavy boughs and rippling with light,
> so soft and green and shady,
> that the druids would have forsaken their oaks to worship in them;

Printers at that time took many liberties with an author's punctuation, many believing that their own skill was superior to that of the author. Shillingsburg (1986) mentions C. H. Timperley's *The Printers' Manual* published in London in 1838, "a book which also laments the ignorance of most writers in the art of punctuation and fantasizes about a world in which authors turn in manuscripts with no punctuation at all, leaving that chore to the professional competence of the compositors." Thoreau received a proof that contained a maximum degree of close punctuation:

> Sometimes I rambled to pine groves,
> standing like temples,
> or like fleets at sea,
> full-rigged,
> with wavy boughs,
> and rippling with light,
> so soft,
> and green,
> and shady that the druids would have forsaken their oaks to worship in them;

He then deleted the commas after "soft" and "green," leaving the published punctuation with which we began.[5] The effect was to treat "soft and green and shady" as a unitary quality of the pine groves, not as a series of three separate qualities.

The example shows us something of how punctuation was negotiated by an author and a printer during the heyday of close punctuation. It also shows how the data from oral reading and repunctuating can be useful in identifying punctuation styles. In the typical case of close punctuation we find agreement between the author and oral readers, but disagreement between the author and modern repunctuators, whose commas are apparently influenced by their experience with more open styles.

At the other extreme, an exaggerated form of open punctuating became a trademark of certain 20th-century writers, among whom in America were Hemingway and Agee. The following passage from the Agee excerpt (the book was published posthumously in 1957) provides an example:

> He has been dead all night while I was asleep and now it is morning and I am awake but he is still dead and he will stay right on being dead all afternoon and all night and all tomorrow while I am asleep again and wake up again and go to sleep again and he can't come back home again ever any more but I will see him once more before he is taken away.

Oral readers divided this passage into as many as 16 intonation units. In the following version the square brackets show the percentage of oral readers who introduced a break at that point:

> He has been dead all night, [100%]
> while I was asleep, [100%]
> and now it is morning, [88%]
> and I am awake, [100%]
> but he is still dead, [100%]
> and he will stay right on being dead, [75%]
> all afternoon, [88%]
> and all night, [88%]
> and all tomorrow, [75%]
> while I am asleep again, [100%]
> and wake up again, [100%]
> and go to sleep again, [100%]
> and he can't come back home again, [63%]
> ever any more. [100%]
> But I will see him once more, [88%]
> before he is taken away. [100%]

Most or all segmented the passage before a conjunction--before "and," "but," "while," and "before"--thus helping to confirm the notion that conjunctions signal prosodic breaks when punctuation is absent. More than half also introduced a prosodic boundary at a potential sentence closure--a place where a sentence could have ended but did not--even when no conjunction followed: "and he will stay right on being dead, all afternoon" and "and he can't come back home again, ever any more."

The repunctuators were, as usual, much less liberal than the oral readers in segmenting this passage. The following version shows a break wherever at least half of the repunctuators introduced one:

He has been dead all night while I was asleep and now it is
morning and I am awake but he is still dead, [50%]
and he will stay right on being dead all afternoon and all night
and all tomorrow while I am asleep again, [63%]
and wake up again, [63%]
and go to sleep again, [50%]
and he can't come back home again ever any more. [100%]
But I will see him once more before he is taken away. [100%]

These breaks were always triggered by the presence of a conjunction, but not every conjunction had this effect.

The oral readers showed what a close punctuator might have done with this passage, and the repunctuators what an open punctuator might have done. Agee's own version, however, was more extreme. It has been thought that writing without commas reproduces somehow a narrator's "stream of consciousness," but that notion is ironic if it is correct to view intonation units as the verbal representations of focuses of consciousness (Chafe, 1980). Consciousness probably flows in spurts rather than in a steady stream, and commas help to capture this spurt-like quality.

Suppressing commas has two other effects. First, it forces the reader to rely wholly on syntax for prosodic divisions. Through a liberal use of "and" (as in the Agee example) it can make that task an easy one, for "and" alone may be almost as good a marker of an intonational boundary as a comma. Second, through its deviation from accustomed usage it calls attention to the language itself. Other writers may use punctuation to increase the transparency of their language. By signaling the boundaries of normal processing units, they relieve readers of the necessity of creating those boundaries for themselves, and thus allow the ideas behind the language to show through without interposing the language as something else to pay attention to. Agee forces his readers to create their own processing units, and in so doing makes his language a separate object of attention. Reading his sentence makes one as aware of the sentence itself as of the ideas behind it. This tactic, of course, can have its own aesthetic value.[6]

POINTS OF DISPUTE

There are specific places in the grammar of English where the presence or absence of a punctuation mark is likely to cause anxiety. These may be places where an inexperienced writer will use punctuation in a way that is considered "wrong," or they may be places where even experienced writers will disagree. Typical of such cases is the presence of a mismatch between one's prosodic imagery and a punctuation rule. I will discuss only two examples here, but the list could easily be multiplied (see also Danielewicz and Chafe, 1985).

Cases where a "Heard" Prosodic Boundary May Need to be Suppressed

In certain places in our data, we found neither the original authors nor the repunctuators using punctuation, but most of the oral readers inserting a prosodic break. In such cases, particularly where an explicit rule of punctuation is involved, we can infer that the boundary inserted by the oral readers did reflect a covertly "heard" break that

was suppressed in writing because of a rule. This inference is confirmed when we find the same rule being ignored by casual or inexperienced writers, or by writers of other periods.

A good example, already discussed and illustrated, is the boundary between a subject and a predicate. Quirk et al. were quoted earlier as describing a common punctuation "error" based on the fact that in speech a sentence "might have a tone unit break where the unacceptable comma has been inserted and we are sometimes tempted to match this with a comma in writing, an error particularly likely to arise with lengthy subjects" (p. 1619). In the current data there were a number of cases where the original author and the repunctuators dutifully omitted punctuation between a subject and a predicate, but where oral readers did introduce such a boundary. In the following examples the read-aloud prosodic boundary is shown with a comma that was, of course, not present in the writing, and the percentage of oral readers who introduced a prosodic break is given in square brackets:

> The car ahead with the "I brake for squirrels" bumper sticker, [85%]
> really does brake for squirrels.
>
> One of the long-standing puzzles of Pacific prehistory, [85%]
> is how the seafaring lineage of Austronesians ...

The subjects of the above clauses may have qualified as "lengthy," but the subject need not be a lengthy one if it conveys information that is completely new, as in the following example where the judge had not been mentioned before:

> Writing the court's opinion,
> Judge Skelly Wright, [90%]
> said he disagreed with the government's argument that the time
> for justice has passed.

It is very tempting in these cases to recommend that the prohibition be relaxed, so that contemporary authors would be free to follow the practice of their 19th-century predecessors. The rule, however, is by now so entrenched that it would be difficult to repeal. For writing teachers, the best practice may be to teach it as an arbitrary rule, while at the same time allowing students to recognize the discrepancy for what it is. There should at least be respect for the sensitivity of student writers who, like accomplished writers of the past, follow their inner voices in this regard. There might even be admiration for the special courage of anyone who went so far as to separate a verb from its *object,* in the rare cases where the verb and object express independent new ideas. The author of the following did not do that, but if he had he would have captured the prosody that was "heard" and expressed by 75 percent of the people who read this passage aloud:

> it is now possible to track archeologically,
> the major part of this migration.

Cases where Punctuation May Need to be Imposed

There are cases of the opposite sort in which an author obeyed a rule dictating the presence--not the absence--of a comma, but where that comma may not have captured a

"heard" prosodic boundary. Contrary to what we might expect, the evidence for such cases does not come from reading aloud. Oral readers, who prefer intonation units that are as short as they can be, seize any excuse to introduce a prosodic boundary. With few exceptions, if a comma is there, an oral reader will respect it. The evidence for the cases I have in mind comes rather from the repunctuators. Where the author used a punctuation mark but most of the repunctuators did not, we can suspect a failure of most silent readers to "hear" a prosodic break. We may wonder why the repunctuators did not respect the rule, but it seems that rules for inserting punctuation are less rigidly adhered to than those forbidding it.

The Chicago Manual of Style recommends that "commas should be used to set off interjections, transitional adverbs, and similar elements that effect a distinct break in the continuity of thought" (p. 140). Transitional adverbs are illustrated with "indeed," "after all," "on the other hand," "therefore," "perhaps," "however," and "consequently." Usually such adverbs express some logical relation between a sentence and the preceding context, like switches that control the progress or sidetracking of a train of thought. Because of this function, they are likely to occur at the beginnings of sentences or clauses. In the following examples, the figures in square brackets show the percentage of repunctuators who duplicated the comma that was present in the original passage. Noteworthy is the fact that it was a minority of the repunctuators who did so:

Yet, [15% of younger subjects]
recent archeological research confirms the conventional wisdom ...

In fact, [25% of older subjects]
a few recent publications argue that the type of paleodemographic
study thought to be most secure ...

A transitional adverb may also occur within a clause, in which case the rule dictates a comma on both sides of it (the percentages are from the younger subjects):

The appeals court ruled that the seven-year statute of limitations did not, [30%]
in fact, [30%]
begin until 1980,

Disc brakes on all four wheels are, [40%]
of course, [40%]
an old story.

The oral readers, being more inclined to introduce boundaries in general, were fairly consistent in doing so after transitional adverbs:

Yet, [60% of younger subjects]
recent archeological research confirms the conventional wisdom ...

In fact, [75% of older subjects]
a few recent publications argue that the type of paleodemographic
study thought to be most secure ...

What the oral readers did with the transitional adverbs located within a clause has some additional interest. Even though at least half of them respected the author's punctuation, more of them introduced a break after the adverb than before it. Thus

there may be a tendency to "hear" such passages in the following way, where I have omitted the first of the two commas. The percentages are for the younger oral readers:

The appeals court ruled that the seven-year statute of limitations
did not [55%] in fact, [75%]
begin until 1980,

Disc brakes on all four wheels are [50%] of course, [80%]
an old story.

Transitional adverbs, then, illustrate boundaries that may be "heard" less often than they are obliged to appear in writing. Again, it would be wise to teach punctuation with this fact in mind, retaining a tolerance or even respect for writers who are sensitive enough to follow what their inner voices "say."

CONCLUSION

I began by pointing to introspective evidence that both writers and readers experience auditory imagery of intonations, accents, and hesitations in written language. I suggested that some aspects of this "written language prosody"--in particular the boundaries of imaged intonation units as well as the terminal contours of these units--are made partially overt through punctuation. If one is to study the degree to which punctuation succeeds in performing this function, one would like to discover some independent ways of uncovering written language prosody. I explored two such ways: asking people to read passages aloud and asking them to repunctuate (insert punctuation marks in passages from which punctuation has been removed). Each of these devices can provide some insights, but each also has its limitations.

People who read aloud nearly always produce intonation units whose length lies within the normal range for ordinary spoken language. The degree to which their segmentations match the punctuation units of a piece of writing provides an index of the degree to which that writing is prosodically spokenlike. Oral reading is also useful in showing how different punctuation marks are prosodically interpreted; for example, periods are almost always interpreted as falling pitches, and commas are usually interpreted as non-falling pitches.

There is no reason to believe that either writers or readers are governed by exactly the same temporal processing constraints that are responsible for the relatively brief intonation units of spoken language. One way of obtaining information on constraints that are more specific to written language may be repunctuation. On the whole, repunctuators come closer than oral readers to matching the punctuation of the original authors, at least so far as the location of punctuation is concerned. They may, at the same time, provide a way of measuring the degree to which a piece of writing captures the auditory imagery that is "heard" by ordinary readers.

I raised the question of why punctuation units, whether of the original authors or of repunctuators, are consistently longer than the intonation units produced by oral readers. I suggested both that (1) writers and (silent) readers are able to process larger chunks of information at a time, and (2) written language provides syntactic as well as punctuational clues to prosodic boundaries. I discussed an example from James that

suggested how an author might be sensitive to the cognitive "accessibility" of a considerable amount of information packed into a single punctuation unit. The same example also suggested how, in the absence of punctuation, the presence of a conjunction might provide a reader with a clue to a prosodic boundary if the reader's cognitive load required such a boundary.

The distinction between "close" and "open" punctuation was discussed in this light. The effects of open punctuation were seen as (1) forcing a reader to rely on syntax alone for prosodic segmentation, and (2) calling the reader's attention to the language itself, removing some of its "transparency." Passages from Thoreau and Agee were discussed as extreme examples of close and open punctuation respectively.

Finally, I discussed two examples of specific grammatical sites at which there is a discrepancy between punctuation and auditory imagery. One was a case in which a "heard" (and read-aloud) boundary must be suppressed because of a punctuation rule. The other was the opposite, a case in which punctuation is inserted by a rule but no segmentation is "heard," as suggested by the failure of repunctuators to insert the prescribed comma. It was suggested that arbitrary rules for the omission and insertion of punctuation should be taught with an appreciation of the fact that they do conflict with auditory imagery.

In spite of these occasional prescribed deviations from the inner voice, and in spite of certain styles of writing that deliberately disregard that voice, the most broadly applicable finding of this study is that most writing most of the time does use punctuation in a way that respects the prosody of written language. Reading aloud and repunctuating are limited ways of making that prosody reveal itself. In the end, however, the most satisfying guidance comes from listening to the inner voice itself. Nurturing that listening can only improve the quality of written language.

Footnotes

1. It is possible, however, that fast reading or skimming tends to degrade this prosody, which evidently comes closest to the prosody of speech when the reader maintains a tempo close to that of speech.

2. The question of whether, or in what centuries, punctuation has been governed by "grammatical" or "rhetorical" considerations has been inconclusively debated for a long time. Deneau (1986) provides a useful summary of this literature. Unfortunately, no detailed history of punctuation practices has yet been written.

3. For these last four examples I am indebted to Sandra Thompson.

4. I am grateful to Loretta Kane and Adelfa Hain for help in processing, respectively, the materials from the younger and the older subjects.

5. For information on the punctuation history of *Walden* I am indebted to Elizabeth Witherell.

6. Deborah Tannen has brought to my attention a curiosity that is quoted in Walker (1985). Lavery (1923) believed that close punctuating was feminine: "... instead of a rugged and bold reliance on words to convey meaning, which would be the masculine way of doing things, the habit has grown up of dressing up a sentence with the lace and ruffles of punctuation." One wonders whether the extremes of open punctuation found in Hemingway and his followers have anything to do with this belief.

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Appendix A: Passages Read Aloud or Repunctuated by Younger Subjects

Automobile Advertisement

Given the right car, almost any particular moment can add to your enjoyment of life. (If that's a little too heavy, okay. But concede that it could be argued that merely idling in a finely tuned, finely engineered automobile can be a kick of ethereal proportions.)

So it's 8:31 in the morning. Let's examine the unbridled joy of driving at 35 miles per hour and lower.

8:31. A world class turn in front of the delicatessen made even more treacherous by the morning's rain. Front-wheel drive, rack-and-pinion steering, wide radial tires. They all work to make the curve gentle and benign.

8:33. A full stop. Disc brakes on all four wheels are, of course, an old story. But it's a good old story.

8:33:07. Another full stop. This one unexpected. But made rapidly and unerringly. The car ahead with the "I brake for squirrels" bumper sticker really does brake for squirrels.

8:36. Town road. The longest straightaway on the course. The 16-valve, intercooled, turbocharged engine, capable of doing 130 and more on a test track, reaches its mandated maximum of 35 mph and purrs nicely along at that speed.

8:38. McDonald's. A black coffee and an Egg McMuffin. The steam from the coffee goes out through the sunroof. Good option, that.

8:41. The gas station. No sweat. Not with the kind of fuel efficiency this car gets despite its performance kicks.

Thoreau, *Walden*

Sometimes I rambled to pine groves, standing like temples, or like fleets at sea, full-rigged, with wavy boughs, and rippling with light, so soft and green and shady that the Druids would have forsaken their oaks to worship in them; or to the cedar wood beyond Flint's Pond, where the trees, covered with hoary blue berries, spiring higher and higher, are fit to stand before Valhalla, and the creeping juniper covers the ground with wreaths full of fruit; or to swamps where the lichen hangs in festoons from the white spruce trees, and toadstools, round tables of the swamp gods, cover the ground, and more beautiful fungi adorn the stumps, like butterflies or shells; where the swamp-pink and dogwood grow, the red alder berry glows like eyes of imps, the waxwork grooves and crunches the hardest woods in its folds, and the wild holly berries make the beholder forget his home with their beauty, and he is dazzled and tempted by nameless other wild forbidden fruits, too fair for mortal taste. Instead of calling on some scholar, I paid many a visit to particular trees, of kinds which are rare in this neighborhood, standing far away in the middle of some pasture, or in the depths of a wood or swamp, or on a hilltop.

James, *The Turn of the Screw*

What I had said to Mrs. Grose was true enough: there were in the matter I had put before her depths and possibilities that I lacked resolution to sound; so that when we met once more in the wonder of it we were of a common mind about the duty of resistance to extravagant fancies. We were to keep our heads if we should keep nothing else--difficult indeed as that might be in the face of all that, in our prodigious experience, seemed least to be questioned. Late that night, while the house slept, we had another talk in my room; when she went all the way with me as to its being beyond doubt that I had seen exactly what I had seen. I found that to keep her thoroughly in the grip of this I had only to ask her how, if I had "made it up," I came to be able to give, of each of the persons appearing to me, a picture disclosing, to the last detail, their special marks--a portrait on the exhibition of which she had instantly recognised and named them. She wished, of course--small blame to her!--to sink the whole subject; and I was quick to assure her that my own interest in it had now violently taken the form of a search for the way to escape from it.

Newspaper Report

Thousands of Japanese Americans forced from their jobs and homes and held in detention camps during World War II can sue the government, a federal appeals court ruled yesterday in Washington.

The 2-to-1 decision, by a panel of the U.S. Court of Appeals for the District of Columbia, removes a legal hurdle that faced thousands of camp survivors trying to win $25 billion in claims against the U.S. government.

Writing the court's opinion, Judge Skelly Wright said he disagreed with the government's argument that "the time for justice has passed."

"Fortunately, the Founders provided that the right to obtain just compensation for the taking of one's property should remain inviolate," he said.

Yesterday's decision reversed the ruling of U.S. District Judge Louis Oberdorfer, who dismissed a suit filed by 19 camp survivors in 1984 on the ground that it was filed after the statute of limitations had run out.

The appeals court ruled that the seven-year statute of limitations did not, in fact, begin until 1980, when a congressional report suggested that the detention of thousands of Japanese Americans was "apparently based on their ethnic origins alone."

The ruling on the suit was particularly gratifying to a Bay Area man, Fred Korematsu, who was a young East Bay welder when he was arrested on a street corner in San Leandro in 1942 and held in camps here and in Utah.

Hemingway, *For Whom the Bell Tolls*

Earlier in the evening he had taken the ax and gone outside of the cave and walked through the new snow to the edge of the clearing and cut down a small spruce tree. In the dark he had dragged it, butt first, to the lee of the rock wall. There close

to the rock, he had held the tree upright, holding the trunk firm with one hand, and, holding the ax-haft close to the head had lopped off all the boughs until he had a pile of them. Then, leaving the pile of boughs, he had laid the bare pole of the trunk down in the snow and gone into the cave to get a slab of wood he had seen against the wall. With this slab he scraped the ground clear of the snow along the rock wall and then picked up his boughs and shaking them clean of snow laid them in rows, like overlapping plumes, until he had a bed. He put the pole across the foot of the bough bed to hold the branches in place and pegged it firm with two pointed pieces of wood he split from the edge of the slab.

Then he carried the slab and the ax back into the cave, ducking under the blanket as he came in, and leaned them both against the wall.

From the *American Anthropologist*

One of the long-standing puzzles of Pacific prehistory is how the seafaring lineage of Austronesians that culminated with the Polynesians was able to sail from Southeast Asia almost all the way across the Pacific against the direction of the prevailing southeast trade winds and South Equatorial Current. To sail eastward thousands of miles seemingly in the face of the steady trades and strong accompanying current would be a formidable task for any sailing vessel, especially a heavily loaded canoe. Yet, recent archeological research confirms the conventional wisdom that this migratory movement stems ultimately from the Asian side of the Pacific, and that many generations of seafarers made their way across the ocean sailing in the tropical latitudes of the South Pacific normally dominated by the westward-flowing southeast trades and the South Equatorial Current. In fact, it is now possible to track archeologically the major part of this migration: starting at the Bismarck Archipelago off New Guinea (longitude 150° east), from where the Lapita ancestors of the Polynesians began moving east around 1500 B.C., to as far as Easter Island (longitude 109° west), which was reached by Polynesians around A.D. 400. How was this extraordinary migration over more than a quarter of the way (in angular measure) around the earth accomplished by neolithic mariners sailing their canoes against the direction of the prevailing trade winds and current?

Appendix B: Passages Read Aloud or Repunctuated by Older Subjects

Thoreau, *Walden*

As I came home through the woods with my string of fish, trailing my pole, it being now quite dark, I caught a glimpse of a woodchuck stealing across my path, and felt a strange thrill of savage delight, and was strongly tempted to seize and devour him raw; not that I was hungry then, except for that wildness which he represented. Once or twice, however, while I lived at the pond, I found myself ranging the woods, like a half-starved hound, with a strange abandonment, seeking some kind of venison which I might devour, and no morsel could have been too savage for me. The wildest scenes had become unaccountably familiar. I found in myself, and still find, an instinct toward a higher, or, as it is named, spiritual life, as do most men, and another toward a primitive rank and savage one, and I reverence them both. I love the wild not less than the good. The wildness and adventure that are in fishing still recommended it to me. I like sometimes to take rank hold on life and spend my day more as the animals do. Perhaps I have owed to this employment and to hunting, when quite young, my closest acquaintance with Nature. They early introduce us to and detain us in scenery with which otherwise, at that age, we should have little acquaintance.

Wharton, *The Age of Innocence*

Once more on the boat, and in the presence of others, Archer felt a tranquillity of spirit that surprised as much as it sustained him.

The day, according to any current valuation, had been a rather ridiculous failure; he had not so much as touched Madame Olenska's hand with his lips, or extracted one word from her that gave promise of further opportunities. Nevertheless, for a man sick with unsatisfied love, and parting for an indefinite period from the object of his passion, he felt himself almost humiliatingly calm and comforted. It was the perfect balance she had held between their loyalty to others and their honesty to themselves that had so stirred and yet tranquillized him; a balance not artfully calculated, as her tears and her falterings showed, but resulting naturally from her unabashed sincerity. It filled him with a tender awe, now the danger was over, and made him thank the fates that no personal vanity, no sense of playing a part before sophisticated witnesses, had tempted him to tempt her. Even after they had clasped hands for good-bye at the Fall River station, and he had turned away alone, the conviction remained with him of having saved out of their meeting much more than he had sacrificed.

Newspaper Report

The doctor who pioneered the theory of Type A behavior says there's hope for those hard-driving individuals he claims make up 75 percent of the adult, male urban population.

Dr. Meyer Friedman told a news conference Monday that counseling designed to mellow out Type A heart attack patients reduced the rate of additional heart attacks.

He said a $1 million, five-year study at Mt. Zion Hopital of 900 heart attack patients showed that the counseling can change deep-seated patterns.

Nearly 30 years ago, Friedman and Dr. Ray Rosenman proposed their theory that men exhibiting Type A behavior were far more likely to suffer heart attacks. Years of medical controversy followed the first report.

Friedman told the news conference counseling reduced Type A behavior in 35 percent of the 600 patients who went through group sessions during the study, partially funded by a federal grant from the National Heart Lung and Blood Institute.

Friedman, a self-confessed Type A on the wagon, said only intensive interviews by trained experts can reliably diagnose Type A behavior.

Other studies have relied on questionnaries and poorly trained interviewers and miss many true Type As, he said.

Type As are punctual people, enraged at late-comers. They often do several things simultaneously, gulp down meals, roar down the fast lane, tailgating and cursing, and are constantly irritated.

Software Advertisement

Tell your PC to mind your phone business. And save 30% on your phone bills.

Chances are you're paying for personal calls that are none of your business. Picking up the tab for client calls that get buried in your bill. And missing out on a lot of valuable personnel information that links your people to your phone bill. But now there's a way to look at who's talking. Decide who's paying. And who's not paying off.

Get Callmonitor on the phone. It's the PC call accounting software system that gives you detailed reports on all business phone usage. Callmonitor makes it easy to manage personal and unauthorized calls to help save time and money. Charge client-related calls to individual accounts. And get a handle on personnel productivity and its correlation to your phone bill--like how many calls it takes a salesperson to close a sale, or how many calls are received in response to an advertisement.

Callmonitor is easy to adapt to your specific needs, with customized data and costing information. Plus quarterly tariff and network updates free for the first year. It's compatible with most major telephone systems and with IBM PC's. Priced at just $495, it can easily pay for itself in no time at all. And it comes with a 30-day money back guarantee.

From the *American Anthropologist*

Broadly conceived, paleodemography is the study of vital rates, population distribution, and density in extinct human groups, especially those for which there are no written records. This charting of differential reproduction and survival in humankind's unwritten past is as elusive as it is crucial in defining the course of human evolution. Persons familiar with the problems inherent in the estimation of demographic parameters

for living human groups characterized by small size and a lack of census records should scarcely be surprised to find that paleodemography is controversial. In fact, a few recent publications argue that the type of paleodemographic study thought to be most secure--the estimation of vital rates for extinct populations from cemetery samples of skeletal remains--is an artifact of "random fluctuations and errors of method." The question then becomes whether paleodemography is a challenging avenue of inquiry, or whether it can be done at all.

Few would argue against the assertion that a critical review of paleodemographic methods and the assumptions made in such study is timely. We are dealing with a composite field where forensic anthropology, physical anthropology, archeology, and demography interface. It would be surprising if tensions did not develop given the differential advances in the various relevant disciplines.

Agee, *A Death in the Family*

When breakfast was over he wandered listlessly into the sitting room and looked all around, but he did not see any place where he would like to sit down. He felt deeply idle and empty and at the same time gravely exhilarated, as if this were the morning of his birthday, except that this day seemed even more particularly his own day. There was nothing in the way it looked which was not ordinary, but it was filled with a noiseless and invisible kind of energy. He could see his mother's face while she told them about it and hear her voice, over and over, and silently, over and over, while he looked around the sitting room and through the window into the street, words repeated themselves, He's dead. He died last night while I was asleep and now it was already morning. He has already been dead since way last night and I didn't even know until I woke up. He has been dead all night while I was asleep and now it is morning and I am awake but he is still dead and he will stay right on being dead all afternoon and all night and all tomorrow while I am asleep again and wake up again and go to sleep again and he can't come back home again ever any more but I will see him once more before he is taken away.